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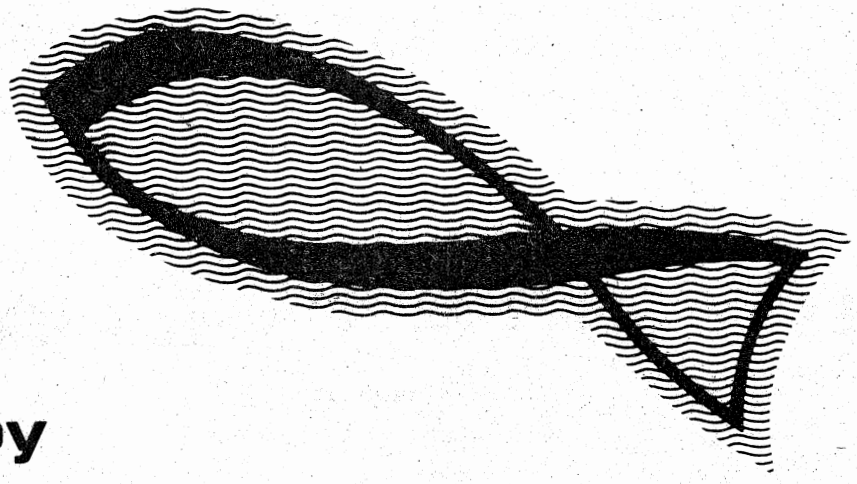
Eel Research 1978—1979



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The good prices paid to fishermen for eels have led to an increased interest in eel capture in Ireland. In that regard the results of stock assessments examined in conjunction with records obtained from other European eel fisheries, have indicated that the present national catch could be increased by at least 100% and perhaps by several times as much. Such an improvement could be effected by the overland transport of elvers from collection points near the coast. An operation of this kind in already in progress on the Shannon river system undertaken by the Electricity Supply Board who own the entire fishery. Sampling of eels within that system have indicated that substantial increases in the numbers of growing eels in the lakes and in the numbers of male silver eels captured, have taken place. Since it takes between ten and twenty years from the beginning of a stocking programme for any results to be apparent it is essential to devise a system for making an accurate assessment of the developments. This is the principal aim of the routine sampling of yellow eels which forms the greater part of current research work.

In 1975 studies of eels in the River Barrow had indicated that substantial quantities were lost to the fishery every year because the existing trapping arrangements allowed a high escapement. There was, therefore, a case for permitting a limited fyke net fishery on the river. A long-term stock assessment exercise was begun on the Barrow in 1979 and results to date indicate that the overall stocking position on the Barrow is satisfactory.

YELLOW EELS

Details of quantities and length frequencies of yellow eels captured in summer fyke net experiments are given in Tables 1 and 2. The fisheries studies comprised three new areas and eight which had been sampled in the past. The new investigations were in Assaroe Lake, Ballinahinch Lake and on the River Barrow at Graiguenamanagh.

Assaroe Lake

Assaroe Lake is a water storage reservoir of length 5 km and area 225 hectares situated between the two hydro-electric dams on the River Erne at Ballyshannon. Large quantities (maximum 2,441 kg in one season) of glass-eels are captured at the two elver passes on the downstream dam at Cathaleen's falls but there is an escapement through a salmon ladder and through the generating turbines into the lake. Larger ascending eels were formerly captured in the fish pass at Cathaleen's Falls and at the upstream dam at Cliff but this was discontinued in 1970. All captured elvers are transported overland to be released into the major lakes of the Erne river system.

There is no fishery for the eels which remain in Assaroe Lake and therefore a preliminary stock-assessment by fyke netting was made in two nights in July. The catch per net was just under 2 kg. At this rate a train of ten nets would capture 20 kg, value £40 per night. Twelve nights fishing should cover the cost of the nets. Fishing ten nets per night would allow the lake to be fished once from end to end in 33 nights, yielding 660 kg. At this intensity a regular annual yield could be expected with a return of the order of £1,000. The eels in Assaroe Lake are on average of large size with fewer than 10% of specimens of less than 40 cm in the samples. This indicates poor recruitment, which would be expected as a result of the capture of all elvers which use the elver ladders.

Ballynahinch Lake

Ballynahinch Lake, County Galway, is a noted sea-trout fishery but its low nutrient level made it unlikely to yield good eel stocks. A small sampling effort made on one night resulted in an unexpectedly large catch of more than seven eels per net. However, the eels were nearly all small ones so that the weight per net was less than 1 kg and more than half the specimens measured less than 35 cm. It is unlikely that such a stock could sustain a viable commercial fishery but the catch indicated good recruitment with the possibility of the existence of a useful stock of elvers. The capture of the small eels in the lake system for use in stocking richer waters could also be considered.

Graiguenamanagh

Fishing at Graiguenamanagh was undertaken as part of a stock assessment exercise on the River Barrow. The first fishing trial was made at Levitstown since this was the only point on the river for which any previous information on stocks was available. Graiguenamanagh was selected for the second trial, being the farthest downstream point where the nets could be operated satisfactorily. Length frequencies of the samples are shown in Figure 1.

The catch in the main river at Levitstown was substantially smaller in numbers than that made in the same stretch of river in 1975. However, the average size of the eels was rather larger than in the sample taken four years previously. This ruled out the possible explanation that the depletion in catch was caused by over-fishing. The effect of overfishing on the length frequencies and mean length would have been the reverse of that observed and would have caused absence of large eels together with the presence of small numbers of small specimens. The 1976 trial took place on the first quarter of the moon while that in 1979 coincided with full moon. The effect of full moon is to reduce the activity of eels and give smaller catches.

Another possible explanation of the relatively smaller catch in 1979 was that there may have been an unusual concentration of eels at Levitstown in 1975 when the trial took place a few weeks after a severe fish kill upstream at Athy. Eels from points upstream of Levitstown could have migrated temporarily downstream to escape from the polluted water and would be likely to have dispersed in the intervening four years. The 1975 catch was the highest ever made in freshwater in Ireland and was certainly exceptional.

The results at Graiguenamanagh were confusing. The catch of 6.4 eels per net downstream of the weir was a reasonable one for an unexploited eel fishery close to tidal water. The catch of 2.1 eels just upstream of this was lower than would have been expected. It is possible that maintenance work in this navigable part of the river may have reduced the food supply and hence the number of eels. On the other hand, the variation between the two points may be no greater than occurs under natural conditions. The smaller size of the Graiguenamanagh eels is to be expected since eels grow as they travel upstream and it is usual to find fewer and larger specimens as distance from the sea increases.

The conclusion from the 1979 work is that the stocks of eels on the Barrow remain at a satisfactory level and there is no evidence of a serious decline. More extensive research work over a period of a number of years will be required.

Sligo Lakes

Sampling in Lough Gill, Co. Sligo, yielded a very small catch of relatively small eels, indicating poor recruitment. The catch in Lough Arrow showed that eels were more plentiful and of much larger size. The rivers draining both lakes enter the sea in Sligo Bay and their estuaries are only 5 km apart from each other. It appears that the main run of elvers from Sligo Bay heads for the Ballysadare River and Lough Arrow and that Lough Gill may be comparatively starved of elvers.

Corrib

Bad weather severely restricted the fishing effort in Lough Corrib and led to twisting of the nets which probably reduced the catch. Catches in the River Corrib were considerably greater than were made at the previous sampling in 1969 and the mean lengths were similar. The River Corrib is an unexploited fishery and is inhabited mainly by young eels.

Lough Derg

The water level of Lough Derg was reduced by approximately 2 metres in July 1979. This resulted in a considerable depletion of eel numbers in the littoral region where routine sampling takes place. When the level rose the following month the eels returned and were captured in unprecedentedly high numbers, as many as 43 per net in Portumna. The indications are that the population of eels in

Lough Derg is continuing to increase as a result of the elver planting programme. The length distribution of the samples remains similar to that recorded in 1974 and 1975. This suggests that relatively few female eels stay permanently in the lake, but that there is a continuous movement to lakes at higher points on the river system.

Blackwater

Two samples were made on the River Blackwater, one in freshwater at Careysville and one in brackish water in Villierstown. Both yielded catches of similar sizes to those made in previous seasons. From the Villierstown results it was calculated that a sustainable annual yield of between 300 and 600 kg could be made from the tidal portion of the Blackwater.

SILVER EELS

Silver eels were sampled on the River Corrib at Galway, on the Shannon at Killaloe and Athlone and on the Barrow at Levitstown. The lengths of all specimens were measured and subsamples were taken from the Corrib and Shannon for age determination. Details of the measurements are given in Table 3.

Most of the Galway specimens were very small. This has always been the case in the Galway fishery. The great majority of specimens were males, indicating that most of the eels in the catch originated in Lough Corrib rather than in the upstream lakes Lough Mask and Lough Carra where male eels are rare. The female specimens were also small, the majority (74%) being less than 50 cm in length. This confirms the conclusion made during the Lough Corrib yellow eel study that Corrib eels reach maturity at a relatively low age.

A small sample of silver eels captured at Athlone in May 1979 was examined. All the specimens were large females, their lengths ranging from 61 to 78 cm. The smallest of these was only 9 years old and one of the larger ones, length 73 cm, was 13 years. The others had ages in the expected range of 15 to 25 years. The presence of the two young specimens suggests that in one or more of the lakes upstream of Athlone conditions for growth are exceptionally good.

In contrast to the situation in 1974 when no male eels were recorded in the samples at Athlone, about 33% of the sample taken in November 1979 were males. This is a clear indication that the elver stocking which began in Lough Ree in 1968 has been effective. Within the next few years the numbers of female eels at Athlone can be expected to increase. The proportion of males in the Lough Derg sample for December 1979 was 56%, a marked increase compared with the situation in 1974.

ELVERS

The search for sources of elvers to be used for stocking lakes was continued. Experiments in capturing and holding elvers were begun at Ballysadare where substantial numbers of glass-eels enter the fish pass. A good run of glass-eels was again observed in the River Erriff and a possible source of supply in Carna was investigated.

Measurements of samples of glass-eels are given in Table 4. A surprising result was that the mean length of a sample from the Erriff on May 23rd was significantly greater than that of a sample taken the following day at Ballysadare. Both samples were taken at waterfalls close to tidal water, the two sites are on the west coast and are approximately 100 km apart. The Erriff specimens were more mature than the Ballysadare sample. At Ballysadare one Stage B, 16 Stage C and 41 Stage D specimens were recorded while on the Erriff there were none at Stage C, 70 Stage D and 13 Stage E.

Table 1. Catch data from summer fyke-net experiments.

		Total effort (nets x days)	Total catch	Catch per unit of effort			
				number	grams	lb.	oz
Lough Derg							
Meelick Bay	May 22	5	62	12.4	2,814	6	3
" "	July 11-12	24	78	3.2	726	1	10
" "	July 13	14	94	6.7	1,	3	6
" "	Aug 21-22	38	243	6.4	1,454	3	3
" "	Oct 24	5	2	0.4	113		4
Portumna	Aug 23	19	442	23.2	5,266	11	10
Assaroe Lake	July 18-19	16	138	8.6	1,922	4	4
Lough Gill	July 19-20	24	28	1.2	155		5
Lough Arrow	July 30-Aug 3	52	127	2.4	576	1	4
River Barrow, Levitstown							
River	Aug 9	20	50	2.5	702	1	9
Canal	Aug 9	20	82	4.1	750	1	10
Graiguenamanagh							
Upstream of weir	Aug 28	20	42	2.1	219		8
Downstream	Aug 28	18	115	6.4	806	1	12
Galway							
Railway bridge	Aug 14	10	78	7.8	1,169	2	9
River Corrib	Aug 15	10	151	15.1	1,764	3	14
Lough Corrib	Aug 16	10	35	3.5	703	1	9
Ballinahinch Lake	Aug 17	10	74	7.4	907	2	0
River Blackwater							
Careysville	Sept 6	8	254	31.8	10,750	24	11
Dromana	Sept 7	8	70	8.8	1,877	4	2

Table 2. Yellow eel length frequencies in 1979 (measurements to nearest cm downwards, frequencies as percentage of n)

		29–34	35–39	40–44	45–49	50–59	60–95	n	Mean	SE
Lough Derg										
Meelick Bay	May	3	31	44	14	8		62	42.1	0.61
	July	3	28	38	19	7	5	227	43.5	0.52
	Aug.	13	33	32	16	5	1	243	40.5	0.37
Portumna	Aug.	3	31	33	19	13	1	442	43.1	0.27
Assaroe Lake	July	2	7	26	31	28	6	219	47.8	0.49
Lough Gill	July	14	36	28	11	7	4	28	41.0	1.34
Lough Arrow	July–Aug.	2	10	26	18	23	21	153	49.2	0.76
River Barrow	Aug.									
Levitstown River			6.0	8	20	50	16	50	52.2	1.03
Levitstown canal		8	31	24	7	20	10	82	45.0	1.05
Graiguenamanagh upstream	"	33	34	29	2	2		42	37.8	1.3
Graiguenamanagh downstream	"	43	32	10	8	2	5	115	37.9	0.8
Galway	Aug.									
Railway Bridge		23	30	27	9	10	1	78	40.4	1.0
River		33	34	19	8	5	1	151	38.3	0.58
Lake		23	51	23	3			35	34.4	1.7
Ballinahinch L.	Aug.	52	25	5	5	5	8	74	37.8	1.17

Table 3 Silver Eels length and age frequencies (Percentage of n)

Length		30–34	35–39	40–44	45–49	50–59	60–69	70–110	n	mean	SE
Galway	5.10.78	37	57	3	2	1			166	35.8	0.26
	24.10.78	36	55	5	3		1		221	36.1	0.26
	17.10.79	48	45	5	1	1			141	35.3	0.31
	14.10.79	35	53	5	5	2			213	36.3	0.28
Athlone	20.11.79	3	18	12	2	18	34	13	77	55.9	1.82
Killaloe	22.11.78	5	2	12	22	31	26	2	1	56.7	1.34
	23.10.79		3		9	54	26	8	65	56.4	1.32
	18.12.79	9	47	7	2	17	10	6	135	45.3	1.10
Levits-town	11.10.79			2	2	49	44	3	43	59.2	0.88

Ages (years)		8–10	11–13	14–16	17–19	20–22	23–25	n	mean	SE
Galway	Males	17	62	19	2			63	12.1	0.24
	Females	4	61	3	4			23	12.9	2.76
Athlone	Females May 1979	10	10	10	30	30	10	10	17.6	1.44
Killaloe	Females Nov. 1979	17	20	33	17	13		24	14.6	0.81

Table 4 Elver length frequencies in 1979 (to nearest mm downards, percentage of n)

Length		61–63	64–66	67–69	70–72	73–75	76–78	n	mean	SE	mean weight
Erriff	23.5.79	2	14	37	30	14	3	182	69.5	0.23	293
Ballysa-dare	24.5.79	6	21	40	23	9	1	183	68.5	0.23	285
Bally-shannon	20.6.79	5	19	24	58	10	4	108	69.1	0.33	

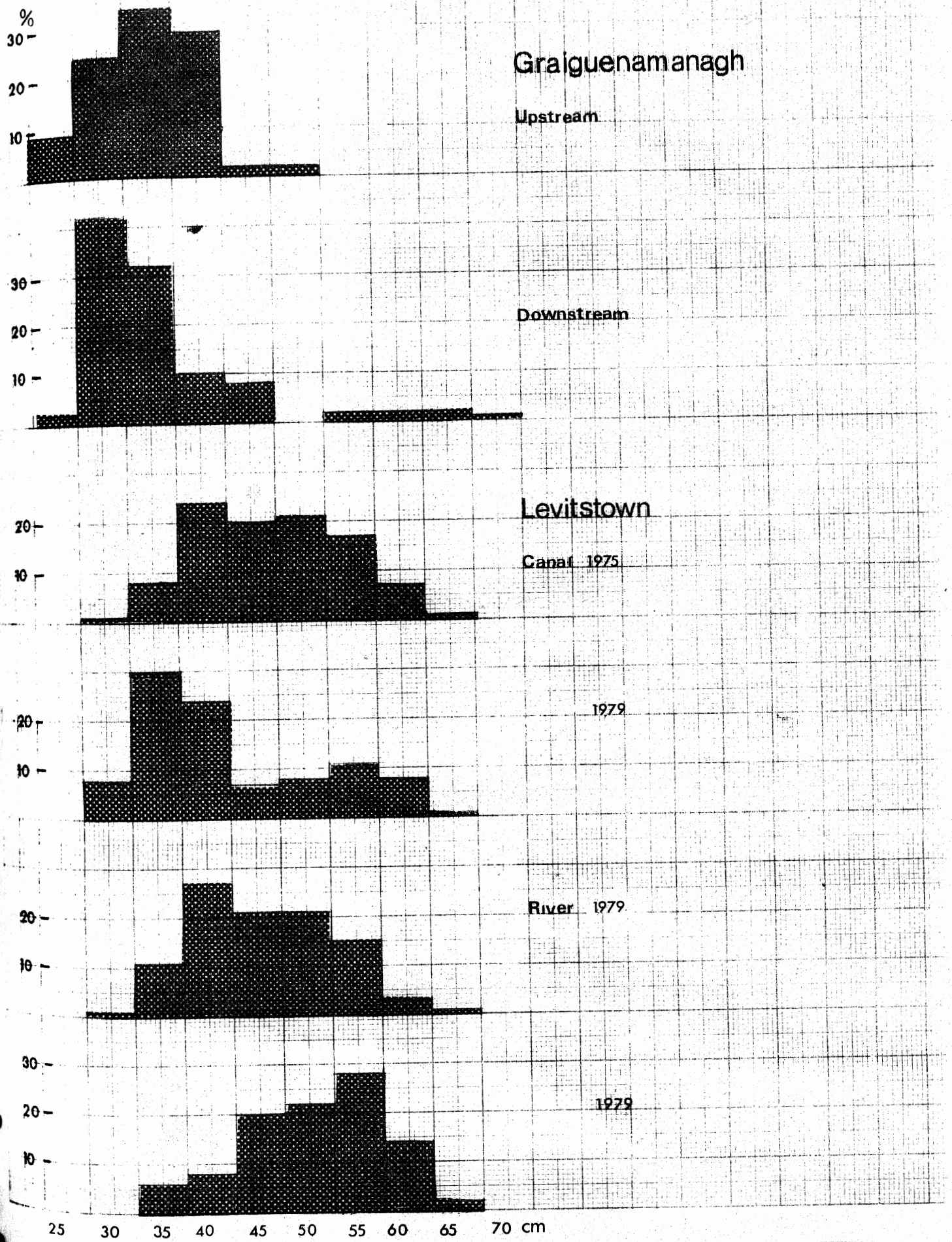

Figure 1. Length frequencies of yellow eels from River Barrow (measurements to nearest cm downwards).